CLAIMS

1. An electromechanical filter, comprising:

a microvibrator that resonates with an input signal; and

a sensing electrode that is arranged at a predetermined interval to the microvibrator,

wherein a quantum device that senses a change in an electrostatic capacity between the microvibrator and the sensing electrode to output the change as an electric signal of the microvibrator is provided.

2. The electromechanical filter according to claim 1, wherein the sensing electrode includes a charge exciting electrode formed on an insulating layer on a substrate, a projection structure formed on a face opposing to the microvibrator of the charge exciting electrode, and a potential sensing electrode formed on the charge exciting electrode via the insulating layer and connected to the projection structure.

3. The electromechanical filter according to claim 1, wherein the microvibrator has a driving electrode arranged at a predetermined interval to the microvibrator, and the microvibrator is excited by an electrostatic force generated between the microvibrator and the driving electrode.

4. The electromechanical filter according to claim 3, wherein an input signal is input into the driving electrode.

5. The electromechanical filter according to claim 1, wherein the

microvibrator is arranged in a magnetic field and is excited by a Lorentz force generated by the magnetic field.

6. The electromechanical filter according to claim 5, wherein an input signal is input into one end of the microvibrator.

7. The electromechanical filter according to any one of claims 1 to 6, wherein the quantum device is a MOSFET.

8. The electromechanical filter according to claim 7, wherein the sensing electrode functions as a gate electrode of the quantum device.

9. The electromechanical filter according to any one of claims 1 to 6, wherein the quantum device is an SET.

10. The electromechanical filter according to claim 9, wherein the sensing electrode functions as a conductive island of the quantum device.

11. The electromechanical filter according to any one of claims 1 to 10, wherein the microvibrator and the quantum device are formed on a same substrate.

12. The electromechanical filter according to any one of claims 1 to 11, wherein the microvibrator and the sensing electrode of the quantum device are formed of a same material.

13. The electromechanical filter according to any one of claims 1 to 12, wherein the sensing electrode of the quantum device is formed of a semiconductor material.

14. The electromechanical filter according to claim 1, further comprising a signal amplifying unit provided to a signal output port side.

15. The electromechanical filter according to claim 1, further comprising a voltage adjusting unit that adjusts a voltage applied to the microvibrator to obtain a desired signal amplification factor.

16. The electromechanical filter according to claim 1, further comprising a voltage adjusting unit that adjusts a gate voltage of the quantum device to obtain a desired signal amplification factor.

17. The electromechanical filter according to claim 1, further comprising a circuit that restores a signal by upconverting the signal which is downconverted to the signal output port side; and

an adjusting unit that adjusts a source-drain voltage of the quantum device to optimize a mixed signal,

wherein the quantum device is usable as a mixer.

18. The electromechanical filter according to claim 1, wherein a plurality of the microvibrators are coupled mechanically.